OPS MODEL TABLE

MODEL	d-c OUTPUT RANGE		OUTPUT IMPEDANCE			
			VOLTAGE MODE		CURRENT MODE *	
	VOLTS	AMPS	SERIES R	SERIES L **	SHUNT R	SHUNT C ***
OPS GROUP IXB						
OPS 500B	0-500	0-0.04	2.2 ohms	100 mH	125 M ohms	0.04µF
OPS 1000B	0-1000	0-0.02	9.0 ohms	100 mH	250 M ohms	0.02µF
OPS 2000B	0-2000	0-0.01	34.0 ohms	100 mH	500 M ohms	0.01µF
OPS GROUP X						
OPS 3500	0-3500	0.01	0.5 ohm	0.1H	350 M ohms	3.3×10^{-9}F
OPS 5000	0-5000	0.005	1.6 ohms	0.1H	500 M ohms	1.6×10^{-9}F

* Current mode using an external current sensing and feedback circuit. Impedance data based on a 10 Volt sample.

** For determining dynamic impedance in voltage mode.

*** For determining dynamic impedance in current mode.

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OPS GENERAL SPECIFICATIONS

SPECIFICATION	CONDITION	RATING/DESCRIPTION
CONTROL		
Type	Voltage	Variable input, fixed gain
	Current	Differential comparison
Voltage	Local	Not available
	Remote analog	0 to 1mA
	Remote digital, 1000V max.	Use SN, SNR interface
Current	Local	Trimmer adjustment
	Remote	0 to 1V d-c
Dynamics	Fast mode only	See dynamics table
User amplifier	Uncommitted	One, for voltage control
References	Two provided	±6.2V, 1mA
Gain	Open loop d-c	1,000,000
MECHANICAL		
Input connection	OPS IXB	Detachable IEC type 3-wire *
	OPS X	Permanently wired *
Output connections	Front panel	Binding posts, OPS IXB only
	Rear panel	Barrier strip
Meters	—	None
Indicators	Pilot	Neon
Mounting (in std 19" racks)	OPS IXB	Use RA-24 Rack Adapter
	OPS X	Mounting "ears" provided
Cooling	Convection	Top surface
Dimensions (HxWxD)	OPS IXB size:	Inches: 5-7/32 x 8-11/32 x 12-7/8 mm: 132.6 x 211.9 x 327
	OPS X size:	Inches: 5-7/32 x 19 x 16-31/32 mm: 132.6 x 482.6 x 431
Finish: Fed Std 595	Front panel	Light gray, color 26440
Weight	Packed for shipment	OPS IXB: 19Lb (8.6kg OPS X: 45Lb (20.4kg)
* Plug pattern #1		

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OPS INPUT /OUTPUT CHARACTERISTICS

SPECIFICATION	CONDITION	RATING/DESCRIPTION
INPUT		
a-c voltage	User selectable	105-125, 210-250
Current	Max load, 115 Vac	0.75A
Frequency	Range	60Hz ± 3Hz
Time Delay	Turn-on	Approximately 30 seconds
OUTPUT		
d-c output	Series pass	Hybrid type
Type of stabilizer	Voltage stabilizer	Current limited
Voltage	Adjustment range for temp. 0-65°C	0 to 100% of rating
Current		0 to 100% of rating
Error Sense	Voltage allowance	0.5V per load
Isolation voltage	Output to ground	1000V d-c or peak
Leakage current, output to ground	rms at 115V a-c	<30 microamperes, OPS IXB
	p-p at 115V a-c	<300 microamperes, OPS IXB
	rms at 115V a-c	<50 microamperes, OPS X
	p-p at 115V a-c	<500 microamperes, OPS X
Series connection	Max voltage off grd.	1000V d-c or peak
Parallel connection	—	Not recommended
OVP	—	Not available

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OPS DYNAMIC SPECIFICATIONS

	STABILIZATION MODE	OPS 500B	OPS 1000B	OPS 2000B	OPS 3500B	OPS 5000B
Bandwidth ($d\text{-}c$ to f_{-3dB})	Voltage	800 Hz	400 Hz	200 Hz	230 Hz	160 Hz
	Current	320 Hz	160 Hz	80 Hz	130 Hz	100 Hz
Programming Time Constant	Voltage	200 µsec (1)	400 µsec (1)	800 µsec (1)	700 µsec (2)	1 msec (2)
	Current (3)	500 µsec	1 msec	2 msec	1.2 msec	1.6 msec
Large Signal Frequency Response	Voltage	320 Hz	160 Hz	80 Hz	135 Hz	100 Hz
Slewing Rate	Voltage	>1V/µsec	>1V/µsec	>1V/µsec	>3V/µsec	>3V/µsec
Transient Recovery	Voltage	<100 µsec	<100 µsec	<100 µsec	<100 µsec	<100 µsec
	Current	500 µsec	1 msec	2 msec	1.2 msec	1.6 msec

(1) Calculated for a feedback resistance of 1000 ohms per volt of output and a feedback capacitance of 400 pF. The range of capacitance available internally is 400 pF to 3900 pF.

(2) Calculated for a feedback resistance of 1000 ohms per volt of output and a feedback capacitance of 200 pF. The range of capacitance available internally is 200 pF to 1900 pF.

(3) Calculated for a load resistance equal to $E_o max/I_o max$ and the tabulated value for equivalent output capacitance.

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OPS STATIC SPECIFICATIONS

INFLUENCE QUANTITY		UNCOMMITTED VOLTAGE CHANNEL (1)		CURRENT CONTROL CHANNEL OUTPUT EFFECTS	REFERENCE ±6.2V ±5% NOMINAL
		OFFSET VOLTAGE ΔE_{io}	OFFSET CURRENT ΔI_{io}		
SOURCE VOLTAGE (min.-max.):		<10µV	<1 nA	<10µA	<0.005%
LOAD (No load — full load):		<10µV (2)	<1 nA	<10µA	—
TIME (8-hour drift):		<20µV	<1 nA	<0.01% of I_O max.	<0.005%
TEMPERATURE, PER °C:		<20µV	<0.5 nA	<0.01% of I_O max.	<0.005%
RIPPLE AND NOISE (4)	rms	<0.01% of E_O max. — or 15 mV (3)		<50µA	—
	p-p (5)	<0.1% of E_O max. — or 150 mV (3)		<250µA	—

(1) The output effect can be calculated by the relationship $\Delta E_o = \Delta E_r (R_f R_i) \pm \Delta E_{io}(1 + (R_f / R_i) \pm \Delta I_{io} (R_f)$ where R_f is the feedback resistor, and R_i is the input resistor from the reference, E_r.

(2) ΔE_{io} for load in current stabilization mode is ΔE_o / open-loop gain. ΔE_o is the compliance voltage change.

(3) Whichever is greater.

(4) One terminal must be grounded or connected so that common-mode current does not flow through the load or, in current mode, through a current sensing resistor.

(5) Peak-to-peak ripple is measured over a 20Hz to 10MHz bandwidth.

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